**Preproposal Report**

**Project Title**: Demographic research on Hakalau Forest NWR's forest birds

**Project Description:**

Hakalau Forest National Wildlife Refuge (Hakalau) is a critical stronghold for 3 endangered, 1 ESA candidate species, and 4 other endemic Hawaiian forest birds. Long-term trends of native forest bird populations at Hakalau have been steady or increasing (Camp et al. 2010), but forest birds across the island of Hawai'i are overall trending downward (Gorresen et al. 2009) and recent (1999-2012) population trends for several species at Hakalau also indicate a downward trend (Camp et al. in press). Population dynamics and trends are driven by a population's vital rates: survival, reproduction, and movement (immigration and emigration). Factors that influence the vital rates of birds include their environment (both biotic and abiotic), availability of habitat and other resources, scales of movement, and exposure to disease. Only by monitoring a population's vital rates can we understand factors influencing trends and have the ability to detect changes in populations that may require management intervention. To date, we have conducted 4 years of banding and 3 years of nest monitoring; we have been very successful in capturing and recapturing birds, re-sighting marked birds, collecting data on bird condition and health, locating nests, monitoring productivity and tracking movements. However, 5 years is the typical length needed for such studies to obtain high-quality data from which robust vital rate estimates can be derived.

The objectives of the proposed study are to directly measure vital rates (survivorship and productivity) and condition of native Hawaiian forest birds at Hakalau through banding mark/recapture efforts and nest searching and monitoring, with an emphasis on identifying factors influencing such vital rates (e.g., elevation, habitat structure, disease, management activities). Second, evaluate whether the vital rates are at sufficient levels to ensure native bird population's long-term viability. Historical estimates of vital rates from all Hakalau forest bird species in the 1990's have been used to create demographic models (manuscript in journal review) which help us understand and identify factors driving population trends. Current data will be plugged into these demographic models to assess viability of species at present.

Banding and nest searching/monitoring will be conducted at the 3 established study sites in Hakalau. Field work will be conducted from February-May (4 months), which is peak breeding period for the majority of forest birds. Upon the completion of this last season of demographic research at Hakalau, we will begin analysis of the mark-recapture data to derive estimates of survival and recruitment, and estimates of site fidelity and movement. Nest monitoring data will be analyzed to develop baseline productivity estimates for each species (currently lacking) and evaluate various factors (e.g., habitat, elevation) that might be affecting productivity.

**Project Type(s):** Monitoring, Research, Analysis/Modeling

**Project Category(ies) (select one or more):** Pests/Invasive Species, Climate Change, Pollinators, Adaptive Management/Restoration, Endangered/Threatened Species Monitoring

**Relevance to Management or Understanding of Refuge Resources:**
Does the project address a refuge management issue? Yes
Does the project provide information about a refuge resource(s) that is lacking or poorly understood? Yes

*If you answered yes to either question, then briefly describe how the project informs a refuge management decision/process and/or enhances knowledge of a refuge resource(s). Also, briefly describe what makes this project notable in comparison to what the refuge staff typically undertakes as part of its regular or reoccurring biological activities.*

Hakalau Forest NWR was created to protect native Hawaiian forest birds. We are in the process of gathering the information to estimate survival rates for all native species, and compare with estimates from the mid-1990s, and develop the first ever estimates of productivity in these birds. Refuge staff conduct annual surveys of forest birds (native and non-native) to monitor population trends. The proposed project will provide essential data on factors driving these trends, allowing the refuge to more effectively evaluate and adapt management efforts.

**Justifications (benefits) for project:**

Evaluate benefits of refuge management (achieving one or more CCP objectives), Evaluate if refuge management is negatively affecting species or habitats, Evaluate effects of climate change, Determine the status and trend of species, species group, or habitat, Evaluate potential effects of refuge uses (wildlife dependent or economic), Continuity of long-term data set to prevent gaps

**Participating refuges:** Hakalau Forest National Wildlife Refuge

**Provide a project timeline:**
This would be the last year of an established 5-year study. Field work would be conducted Feb-May 2016. Immediately following field work, we would enter all data into a USGS database (a copy would be provided to the refuge). Analysis of mark-recapture and nest monitoring data would be started immediately for rapid dissemination of study results. We will provide a summary report by the end of the fiscal year, and have draft journal manuscripts describing survival and productivity rates ready for submission by the end of the calendar year 2016.

**Budget estimate** (If the project requires multiple years, then itemize cost annually.)
Estimated cost (direct and indirect costs combined) would $56,000 for the field crew (4 banders and 5 nest monitors), with USGS and Hakalau Forest NWR providing funds to cover an additional nest monitor, vehicles, housing, and all equipment costs. Detailed budget available upon request.

**Possible funding sources (select one or more):** SSP, I&M

**How will the project funding be fully spent or obligated? (select one or more):**
Agreement

**How could the project be conducted? (select one or more):**
Refuge staff, Volunteer(s), Graduate Student Project, USGS researchers

**Are there partners that would be directly involved with the project?** Yes

*List them and briefly describe their roles/contributions. Partners can be FWS program staff (e.g., Water Resources, Fire, Migratory Birds, I&M) or non-FWS entities providing in-kind support (e.g., equipment, staff time, funding).*

Eben Paxton, USGS Pacific Island Ecosystems Research Center - lead on field studies, data analysis and manuscript writing. USGS will provide in-kind support with staff time and field equipment.

**What are the expected product(s)?** Publication, Model, Database

**Contact person:** Steve Kendall, Hakalau Forest NWR Wildlife Biologist, 808-443-2300, steve_kendall@fws.gov, Eben Paxton, USGS Pacific Island Ecosystems Research Center, 808-985-6423, epaxton@usgs.gov.